

Analysis of Solubility of Magnesium Perchlorate, Perchlorate Acid, Water Systems at Optimum Temperature

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Annotation:

Currently, it is important to analyze solutions not only theoretically, but also practically. Studying the solubility of substances is especially noteworthy when studying aqueous solutions. When studying solubility problems, it is important to take a comprehensive approach to the properties and properties of the solvent and components. This article analyzes the solubility of magnify perchlorate, perchlorate cystola, water systems at optimal temperature.

Keywords: magnetic perchlorate, three-component systems, two-component systems, solubility, solid phase.

At present, in the study of solutions, it is important to analyze not only theoretically, but also practically. Studying the solubility of substances is especially noteworthy when studying aqueous solutions. When studying solubility problems, it is important to take a comprehensive approach to the properties and properties of the solvent and components.

The physical parameters of two-component systems are analyzed in the literature on solubility. For example: crystal lattice of salts, hydration energy, entropy of ions, radius of ions are among them. In addition, according to D. I. Mendeleev's periodic law, changes in the solubility of salts with temperature were analyzed.

In our opinion, it is better to study the solubility of three-component systems at different temperatures and to compare the individual properties of ions and to study aspects of dependence on solvent structures.

From this point of view, for experimental comparison and to study the properties of three-component systems, the solubility of $\text{Mg}(\text{ClO}_4)_2\text{-HClO}_4\text{-H}_2\text{O}$ and other systems in the main subgroup of the second group of D.I. Mendeleev's periodic system is studied at different temperatures. Such an approach consists in analyzing the hydration of cations, the individual properties of ions, and the relationship of ions to the structure of water.

It consists in studying solubility isotherms at different temperatures, i.e. at 0° , 25° , 50° C.

Thus, in studying the solubility of three-component systems, that is, $\text{Mg}(\text{ClO}_4)_2\text{-HClO}_4\text{-H}_2\text{O}$, it is important to carefully observe the individual properties of ions when the concentration of the acid is increased.

In our work, different concentrations of magnesium perchlorate and perchloric acid are used. Perchloric acid 72% chemically pure acid was used. Anhydrous acid was used from the following reaction: $2\text{KClO}_4 + \text{H}_2\text{SO}_4 = \text{K}_2\text{SO}_4 + 2\text{HClO}_4$. As a result of repeated recrystallization of the magnesium perchlorate salt, a pure chemical salt was obtained and used for the experiment.

Ion concentrations were determined by titration of magnesium ion with trilon B indicator, and concentrations of perchloric acid were determined using red methyl indicators. All analyzes were measured using an analytical balance with an accuracy of 0.05%.

Determining the vapor pressure of solutions directly depends on the following factors:

1) Purity of reagents, 2) Accurate sampling, 3) Accuracy of analytical determination, 4) Correct control of the temperature in the thermostat. received. Small bags were used for the tests. Perchloric acid was prepared in 57% chemical purity. The salt was filtered by passing through the filter shot several times.

First, the filter is passed through shot No. 1 and No. 2. After the salt is recrystallized several times, the filter shot is passed through No. 3 and No. 4. Later it was taken for inspection and analyzed.

Solubility of systems $\text{Mg}(\text{ClO}_4)_2\text{-HClO}_4\text{-H}_2\text{O}$

Solid phase						Structure of solid phases
mass %		mol/1000g.N ₂ O		mass%		
Mg(ClO ₄) ₂	HClO ₄	Mg(ClO ₄) ₂	HClO ₄	Mg(ClO ₄) ₂	HClO ₄	
Temperatura 0 ⁰ C						
48,21	-	4,16	-	-	-	Mg(ClO ₄) ₂ .6H ₂ O
41,19	7,21	3,57	1,39	-	-	-/-
29,37	19,19	2,56	3,71	-	-	-/-
20,74	28,75	1,86	5,66	45,38	13,47	-/-
15,56	34,90	1,41	7,00	-	-	-/-
9,10	42,22	0,84	8,63	38,41	20,66	-/-
4,34	49,05	0,41	10,47	-	-	-/-
1,08	55,90	0,11	12,93	-	-	-/-
0,05	66,36	0,01	19,65	-	-	-/-
0,29	71,24	0,06	24,89	30,22	39,00	-/-
1,45	73,55	0,26	29,24	39,79	30,80	-/-
3,25	72,56	0,60	29,84	-	-	Mg(ClO ₄) ₂ .6H ₂ O+
						Mg(ClO ₄) ₂ .4H ₂ O
3,17	72,62	0,58	29,85	-	-	-/-

3,54	72,79	0,67	20,59	40,82	34,98	Mg(ClO ₄) ₂ .4H ₂ O+
5,00	72,76	11,00	32,48	30,45	50,85	Mg(ClO ₄) ₂ .4H ₂ O+
						Mg(ClO ₄) ₂ .2H ₂ O
3,28	75,01	0,67	34,62	-	-	Mg(ClO ₄) ₂ .2H ₂ O
3,00	75,61	0,63	35,17	1,75	79,54	Mg(ClO ₄) ₂ .2H ₂ O+
						HClO ₄ .H ₂ O
1,18	76,40	0,24	33,90	1,12	80,05	HClO ₄ .H ₂ O
Temperatura 25 ⁰ C						
50,00	-	4,47	-	-	-	Mg(ClO ₄) ₂ .6H ₂ O
32,67	17,86	2,94	3,58	-	-	-//-
21,32	29,80	1,95	6,06	-	-	-//-
11,85	41,59	1,14	8,88	-	-	-//-
2,80	55,00	0,29	12,96	-	-	-//-
0,62	63,00	0,07	17,92	44,85	19,30	-//-
0,77	68,71	0,11	22,40	40,96	25,06	-//-
1,70	71,14	0,28	26,06	39,89	28,51	-//-
6,80	68,92	1,08	27,43	-	-	-//-
7,30	68,30	1,27	27,54	41,55	29,87	Mg(ClO ₄) ₂ .6H ₂ O+
						Mg(ClO ₄) ₂ .4H ₂ O
7,03	69,47	1,33	29,41	40,11	35,98	-//-
8,25	69,34	1,65	30,78	19,64	57,22	Mg(ClO ₄) ₂ .4H ₂ O+
						Mg(ClO ₄) ₂ .2H ₂ O
6,80	71,41	1,39	32,61	-	-	-//-
4,34	71,41	1,39	32,61	-	-	Mg(ClO ₄) ₂ .2H ₂ O+
						HClO ₄ .H ₂ O
1,72	78,41	0,38	38,77	0,74	82,08	-//-
-	79,21	-	31,37	-	-	-//-
Temperatura 50 ⁰ C						
52,25	-	4,90	-	-	-	Mg(ClO ₄) ₂ .6H ₂ O
37,40	15,20	3,57	3,18	-	-	-//-
25,00	28,75	2,42	6,18	-	-	-//-
7,55	50,03	0,75	11,73	-	-	-//-
2,20	60,85	0,27	16,38	-	-	-//-
1,88	66,12	0,26	20,56	41,36	26,76	-//-
3,45	68,19	0,54	23,92	-	-	-//-
5,77	67,31	0,96	24,87	-	-	-//-
8,06	65,91	1,38	25,19	36,00	34,75	-//-
13,12	61,31	2,29	23,92	-	-	-//-
-	-	24,4	23,54	-	-	-//-
14,00	60,78	2,48	23,98	32,48	42,40	-//-
14,18	61,71	2,69	25,46	-	-	-//-
15,67	61,88	3,13	27,43	-	-	-//-
16,11	61,57	3,23	27,45	-	-	-//-
16,42	61,27	3,29	27,32	-	-	-//-
13,93	64,41	2,88	29,68	-	-	-//-
11,27	67,55	2,38	31,73	26,49	53,50	-//-
6,08	74,81	1,42	38,89	33,81	49,5	-//-
2,85	80,50	0,76	48,29	52,39	51,51	-//-

In our work, after the $\text{Mg}(\text{ClO}_4)_2$ salt is recrystallized several times as mentioned above, the filter is passed through the shot several times.

A higher concentration is achieved by driving a lower concentration of perchloric acid to obtain a higher concentration.

References

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